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Unconventional Computation

6th International Conference, UC 2007
Kingston, Canada, August 13-17, 2007
Proceedings

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Preface

The Sixth International Conference on Unconventional Computation, UC 2007, organized under the auspices of the EATCS by the Centre for Discrete Mathematics and Theoretical Computer Science (Auckland, New Zealand) and the School of Computing, Queen's University (Kingston, Ontario, Canada) was held in Kingston during August 13–17, 2007. By coming to Kingston, the International Conference on Unconventional Computation made its debut in the Americas.

The venue for the conference was the Four Points Hotel in downtown Kingston on the shores of Lake Ontario. Kingston was founded in 1673 where Lake Ontario runs into the St. Lawrence River, and served as Canada's first capital. Renowned as the fresh-water capital of North America, Kingston is a major port to cruise the famous Thousand Islands. The 'Limestone City' has developed a thriving artistic and entertainment life and hosts several festivals each year. Other points of interest include Fort Henry, a 19th century British military fortress, as well as 17 museums that showcase everything from woodworking to military and technological advances.

The International Conference on Unconventional Computation (UC) series, <https://www.cs.auckland.ac.nz/CDMTCS/conferences/uc/>, is devoted to all aspects of unconventional computation, theory as well as experiments and applications. Typical, but not exclusive, topics are: natural computing including quantum, cellular, molecular, neural and evolutionary computing; chaos and dynamical system-based computing; and various proposals for computations that go beyond the Turing model.

The first venue of the Unconventional Computation Conference (formerly called Unconventional Models of Computation) was Auckland, New Zealand in 1998; subsequent sites of the conference were Brussels, Belgium in 2000, Kobe, Japan in 2002, Seville, Spain in 2005, and York, UK in 2006.

The titles of volumes of previous UC conferences are the following:

1. C. S. Calude, J. Casti, and M. J. Dinneen (eds.). *Unconventional Models of Computation*, Springer-Verlag, Singapore, 1998.
2. I. Antoniou, C. S. Calude, and M. J. Dinneen (eds.). *Unconventional Models of Computation, UMC'2K: Proceedings of the Second International Conference*, Springer-Verlag, London, 2001.
3. C. S. Calude, M. J. Dinneen, and F. Peper (eds.). *Unconventional Models of Computation: Proceedings of the Third International Conference, UMC 2002*, Lecture Notes in Computer Science no. 2509, Springer-Verlag, Heidelberg, 2002.
4. C. S. Calude, M. J. Dinneen, M. J. Pérez-Jiménez, Gh. Păun, and G. Rozenberg (eds.). *Unconventional Computation: Proceedings of the 4th International Conference, UC 2005*, Lecture Notes in Computer Science no. 3699, Springer, Heidelberg, 2005.

5. C. S. Calude, M. J. Dinneen, Gh. Păun, G. Rozenberg, and S. Stepney (eds.). *Unconventional Computation: Proceedings of the 5th International Conference, UC 2006*, Lecture Notes in Computer Science no. 4135, Springer, Heidelberg, 2006.

The Steering Committee of the International Conference on Unconventional Computation series includes T. Bäck (Leiden, The Netherlands), C. S. Calude (Auckland, New Zealand (Co-chair)), L. K. Grover (Murray Hill, NJ, USA), J. van Leeuwen (Utrecht, The Netherlands), S. Lloyd (Cambridge, MA, USA), Gh. Păun (Seville, Spain and Bucharest, Romania), T. Toffoli (Boston, MA, USA), C. Torras (Barcelona, Spain), G. Rozenberg (Leiden, The Netherlands and Boulder, Colorado, USA (Co-chair)), and A. Salomaa (Turku, Finland).

The four keynote speakers of the conference for 2007 were:

- Michael A. Arbib (U. Southern California, USA): *A Top-Down Approach to Brain-Inspired Computing Architectures*
- Lila Kari (U. Western Ontario, Canada): *Nanocomputing by Self-Assembly*
- Roel Vertegaal (Queen’s University, Canada): *Organic User Interfaces (Owi!): Designing Computers in Any Way, Shape or Form*
- Tal Mor (Technion–Israel Institute of Technology): *Algorithmic Cooling: Putting a New Spin on the Identification of Molecules*

In addition, UC 2007 had two workshops, one on Language Theory in Biocomputing organized by Michael Domaratzki (University of Manitoba) and Kai Salomaa (Queen’s University), and another on Unconventional Computational Problems, organized by Marius Nagy and Naya Nagy (Queen’s University). Moreover, two tutorials were offered on Quantum Information Processing by Gilles Brassard (Université de Montréal) and Wireless Ad Hoc and Sensor Networks by Hossam Hassanein (Queen’s University).

The Programme Committee is grateful for the much-appreciated work done by the paper reviewers for the conference. These experts were:

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The Programme Committee consisting of S. G. Akl (Kingston, ON, Canada), A. G. Barto (Amherst, MA, USA), A. Brabazon (Dublin, Ireland), C. S. Calude (Auckland, New Zealand), B. S. Cooper (Leeds, UK), J. F. Costa (Lisbon, Portugal), M. J. Dinneen (Auckland, New Zealand (Chair)), G. Dreyfus (Paris, France), M. Hagiya (Tokyo, Japan), M. Hirvensalo (Turku, Finland), N. Jonoska (Tampa, FL, USA), J. J. Kari (Turku, Finland), V. Manca (Verona, Italy),

Gh. Păun (Seville, Spain and Bucharest, Romania), F. Peper (Kobe, Japan), P .H. Potgieter (Pretoria, South Africa), S. Stepney (York, UK), K. Svozil (Vienna, Austria), C. Teuscher (Los Alamos, NM, USA), C. Torras (Barcelona, Spain), R. Twarock (York, UK), H. Umeo (Osaka, Japan), H. T. Wareham (St. John's, NL, Canada (Secretary)), and D. Woods (Cork, Ireland) selected 17 papers (out of 27) to be presented as regular contributions.

We extend our thanks to all members of the local Conference Committee, particularly to Selim G. Akl (Chair), Kamrul Islam, Marius Nagy, Yurai Núñez, Kai Salomaa, and Henry Xiao of Queen's University for their invaluable organizational work. We also thank Rhonda Chaytor (St. John's, NL, Canada) for providing additional assistance in preparing the proceedings.

We thank the many local sponsors of the conference.

- Faculty of Arts and Science, Queen's University
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- School of Computing, Queen's University
- Office of Research Services, Queen's University
- Department of Biology, Queen's University
- The Campus Bookstore, Queen's University
- MITACS - Mathematics of Information Technology and Complex Systems
- IEEE, Kingston Section

It is a great pleasure to acknowledge the fine co-operation with the *Lecture Notes in Computer Science* team of Springer for producing this volume in time for the conference.

May 2007

Selim G. Akl
 Christian S. Calude
 Michael J. Dinneen
 Grzegorz Rozenberg
 Harold T. Wareham

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